Coccoloba uvifera (L.) L. Sea grape, Uva de playa

Polygonaceae Buckwheat family

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Coccoloba uvifera (L.) L., commonly known as sea grape, uva de playa or uvero in Spanish, and raisin bord-de-mer in French, is a small, low-branching shrub or tree that grows up to 15 m in height. It has thick, smooth branches and a stout trunk that reaches 70 cm in d.b.h. Very common on coastal dunes and rocky shores within its native Caribbean range, sea grape is easily recognized by its large, thick, nearly circular leaves and long, grapelike clusters of edible fruits (fig. 1). Its wood is of little value in Puerto Rico except for posts and fuel, although it is suitable for handicrafts, furniture, and cabinetwork.

HABITAT

Native and Introduced Ranges

Sea grape is native to the coasts of southern Florida, Bermuda, the Bahamas, the West Indies, northern and eastern South America to Brazil, Mexico, Central America, and the Pacific coast of South America as far south as Peru (*25, 26*) (fig. 2). It was introduced to the Philippines and Zanzibar during the 1940's, and has been planted as a seashore windbreak in Hawaii (*25*).

Climate

The native range of sea grape includes the tropical very dry, dry, and subtropical moist forest life zones (sensu Holdrige, *11*). Within this range, mean annual rainfall varies from approximately 500 to 1600 mm without a dry season or a dry season lasting up to 8 months (*32*). Mean annual temperatures during the warmest months average about 28°C throughout the range. During the coolest months, mean temperatures range from 18°C in the north to 26°C in the south (*10, 28*). In southern Florida, sea grape is subject to rare frosts (*25*).

Soils and Topography

Sea grape is one of the first species to colonize sandy and rocky shores. It is very salt tolerant (*22*) and grows well in nearly pure sands and rocky substrates along the coast. It can survive on calcareous soils, including oolitic limestone, and on dry or wet soils derived from igneous rocks, as long as these sites are freely drained (*7, 25*). It grows best in well-drained, loamy sands with pH values greater than 7.5 (*2, 32*).

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Sea grape is usually limited to coastal areas and is rarely found in inland forests (*1, 8, 18*). In Cuba and Jamaica, where sea grape grows best, it is found in moist forests up to 150 m in elevation (*26*).

Associated Forest Cover

In Puerto Rican coastal dune forests, sea grape is typically associated with *Chrysobalanus icaco* L., *Cocos nucifera* L., *Suriana maritima* L., *Terminalia catappa* L., *Thespesia populnea* (L.) Soland ex Correa, and understory shrubs such as *Dalbergia ecastaphylla* (L.) Taubert, *Opuntia* spp., and *Scaveola plumieri* (L.) Vahl (*6*). In Jamaica, it grows in strand dune shrub formations with *Borrichia arborescens* (L.) DC., *Scaevola plumieri*, *Suriana maritima,* and *Tourrefortia gnaphalodes* (L.) R. Br. (*29*).

In Bermuda, sea grape grows in low stature stands (4 to 7 m in height) with *Conocarpus erectus* L. along the coast; further inland, its principal associate is *Sabal blackburnianum* Glazebrook in stands up to 12 m in height (*15*).

In Barbados, sea grape is the most abundant species in dune shrub formations, where it grows in association with *Caesalpinia bonduc* (L.) Roxb., *Calotropis procera* (Ait.) Ait. f., *Chrysobalanus icaco*, *Hippomane mancinella* L., and *Tabebuia heterophylla* (DC.) Britton. It is also found in coastal woodlands in association with *Ceiba pentandra* (L.) Gaertn., *Cordia obliqua* Willd., *C. sebestena* L., *Ficus citrifolia* P. Miller, *H. mancinella*, *Leucaena leucocephala* (Lam.) de Wit, *T. heterophylla, Terminalia catappa*, and

Figure 1. — *Sea grape,* Coccoloba uvifera *(L.) L., growing along the coast in Puerto Rico.*

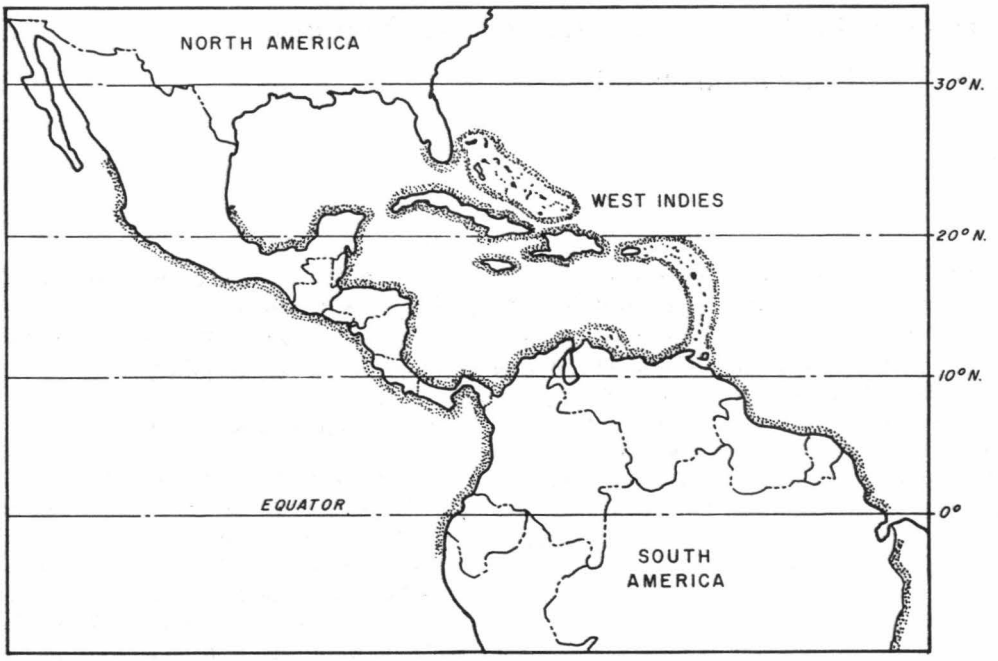

Figure 2. — *The native range of sea grape,* Coccoloba uvifera *(L.) L., indicated by shaded areas along seacoasts.*

Thespesia populnea (*8*). It grows in littoral woodlands in the Leeward Islands in a codominant position with *T. populnea*, and in the Windward Islands in association with *Calophyllum brasiliense* Jacq., *Chrysobalanus icaco, Coccoloba diversifolia* Jacq., *Conocarpus erectus, Erithalis fruticosa* L., *Guapira fragrans* (Dum.-Cours.) Little, and *Tabebuia heterophylla* (*29*). In Trinidad and Tobago, sea grape is typically associated with *Hibiscus tiliaceus* L. in early successional formations along the coast (*21*).

LIFE HISTORY

Reproduction and Early Growth

Flowering and Fruiting.—Sea grape is dioecious with male and female flowers borne on separate trees. The racemose terminal and lateral inflorescences that bear numerous small, scented flowers are between 10 and 23 cm in length (fig. 3). The individual flowers are whitish or greenish white and measure 5 mm in diameter. The male flowers have a 1.5-mm long basal tube (hypanthium) bearing five spreading, rounded, white calyx lobes, eight stamens united at the base, and a rudimentary pistil. The female flowers consist of a larger pistil with a one-celled ovary, three styles, and nonfunctional stamens (stamenodes) (*7, 18*).

The elliptic or egg-shaped fruits are grouped in clusters resembling bunches of grapes. Individual fruits measure about 2 cm in diameter and are purple when ripe. They are composed of a single elliptic seed (achene) about 1 cm long surrounded by an edible, tartly sweet pulp and a thin, fleshy covering. The average weight for a sample of ripe fruits collected in Puerto Rico was 4.75 g per fruit (author, personal observation). Sea grape produces flowers and fruits throughout the year in Puerto Rico (*18*). In Jamaica, flowering occurs mainly between January and August, and fruiting, between March and October (*1*).

Seed Production and Dissemination.—Trees grown from seeds usually begin to flower and fruit in 6 to 8 years (*25*). In tests conducted in Puerto Rico, average seed weights for two samples of 50 fresh seeds with a moisture content of 38 and 47 percent, respectively, were 0.72 ± 0.03 and 0.96 ± 0.02 g per seed, or between 1,040 and 1,400 seeds per kg (author, personal observation). Expressed on an ovendried-weight basis, there are between 1,980 and 2,260 seeds per kg. The seeds are dispersed by fruit-eating birds.

Seedling Development.—Germination in sea grape is epigeal. No pretreatment is required. Seeds should be sown at or near the surface in light-textured, well-drained soils. Germination in fresh seeds is between 60 and 88 percent and takes place between 18 and 50 days after sowing (*20*; author, personal observation). Seedlings develop a deep, fibrous root system and reach plantable size, approximately 15 cm in height, between 4 and 5 months after sowing (author, personal observation). Plantations can be established using wildlings, although nursery-grown seedlings or rooted cuttings are more commonly used. Natural regeneration is abundant in the vicinity of mature trees.

Vegetative Reproduction.—Sea grape can be propagated vegetatively by air layering, ground layering, and grafting, although mature wood cuttings are most commonly used to produce rooted cuttings for mass propagation of female trees of selected cultivars (*7, 25*).

Sapling and Pole Stage to Maturity

Growth and Yield.— At the limits of its range and on poor sites, sea grape grows as a shrub or a low, densely

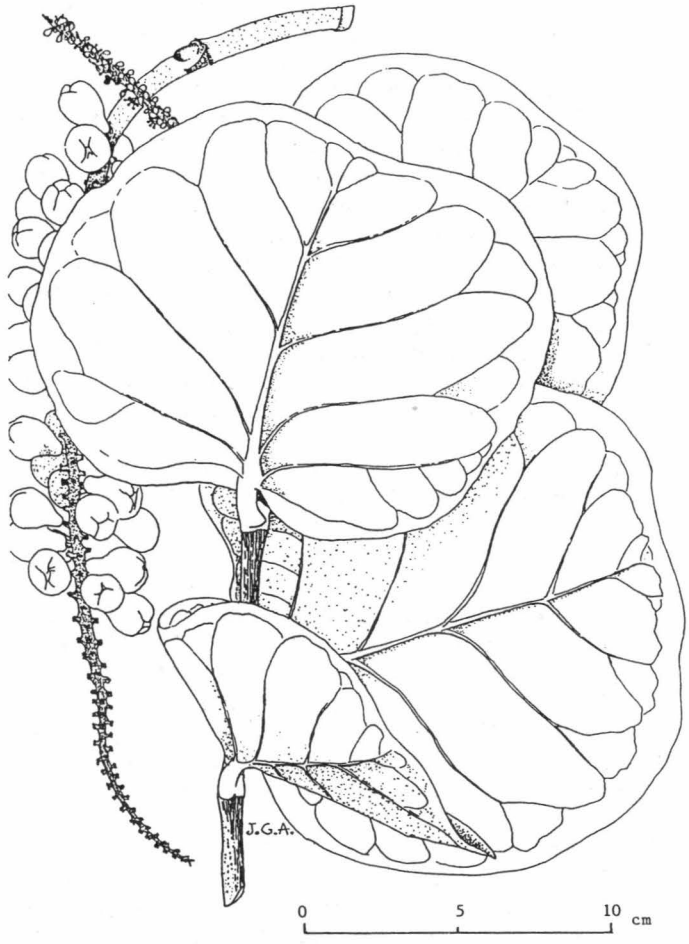

Figure 3. — *Foliage and fruit of sea grape,* Coccoloba uvifera *(L.) L. (18).*

branched tree with stem diameters at breast height (d.b.h.'s) of up to 30 cm (*7*). Height growth is strongly influenced by wind exposure; on exposed sites, tree heights typically increase from the windward to leeward edges of sea grape stands. On better sites, it grows to maximum heights of between 8 and 18 m with d.b.h.'s of between 45 and 60 cm (*26*). The largest sea grape recorded in Puerto Rico measures 9.1 m in height with a d.b.h. of 40.1 cm.[1]

At a typical coastal site with sandy soils in northeastern Puerto Rico, average heights of 0.94 and 2.85 m were recorded for 1- and 3-year-old plantings under rainy conditions (author, personal observation). There are no data available on growth rates for older trees.

Rooting Habit.—In sandy soils, sea grape typically produces a deep, stout taproot and numerous thin, wiry laterals with abundant fine, feeder roots (author, personal observation). The fine roots form a symbiotic association with ectotrophic mycorrhizae (*3*).

[1] Puerto Rican champion tree register. On file with: International Institute of Tropical Forestry, U.S. Department of Agriculture, Forest Service, Río Piedras, PR 00928-2500.

Reaction to Competition.—Sea grape is a light-demanding species that does not compete well with grasses, herbs, or other trees at the seedling stage. Seedling and sapling growth rates are markedly slower under light shade than in full sunlight (author, personal observation). Seedlings should be weeded until they are taller than competing vegetation.

Damaging Agents.—Sea grape is a host for several potentially damaging insect species and pathogens throughout its range, although these agents rarely kill mature trees. Under adverse conditions, the leaves are susceptible to damage by certain pathogens (*25*). In southern Florida, Puerto Rico, and the Virgin Islands, these include *Asterina coccolobae* Ferd. & Winge, *Lembosia tenella* Lév., *Pestalotia coccolobae* Ell. & Ev., *Phyllosticta coccolobae* Ell. & Ev., *Uredo coccolobae* P. Henn., *U. uviferae* Syd., and *Verticicladium effusum* Earle (*27, 30*).

In Puerto Rico, sea grape has been reported as the host for more than 50 species of insects (*23*). These include 24 species of Homoptera, 14 species of Coleoptera, and fewer species of Diptera, Hemiptera, Hymenoptera, Isoptera, Lepidoptera, and Thysanoptera. Although most of these species do not cause any serious damage, two defoliating species, *Euscelus coccolobae* (Wolcott) (Coleoptera: Curculionidae) and *Sericocerina krugii* (Cresson) (Hymenoptera: Argidae), are considered economically damaging and widespread pests of sea grape in Puerto Rico. In southern Florida, 12 species, including defoliating insects, gall insects, twig borers, scale insects, and sapsucking insects, are reported to cause either minor or only occasionally serious damage to sea grape (*4, 5, 9, 24*). In the British Virgin Islands, the buprestid beetle *Polycesta porcata* (F.) is considered a pest of economic importance (*24*). Sapwood damage caused by the wet-wood termite *Nasutitermes costalis* (Holmgren) has been observed in Puerto Rico. Sea grape has been reported as a host of the nematodes *Xiphinema machoni* n. sp. and *Longidorus edmundsi* n. sp. in the Windward Islands of the West Indies (*12, 13*).

SPECIAL USES

Sea grape wood is differentiated into light-brown sapwood and reddish-brown to dark-brown heartwood. The wood is hard, close grained, and fairly heavy with a specific gravity of 0.7 g/cm^3 air-dried (*18*). It is very susceptible to attack by the West Indian dry-wood termite, *Cryptotermes brevis* (Walker) (*33*). It takes a fine polish and is used in turning and occasionally for furniture, inlay work, and cabinetry (*8*). Throughout its range, the wood is commonly used as firewood and for making charcoal.

The edible fruits can be eaten raw, used in jellies, or fermented like grapes to make wine (*8*). Its flowers yield abundant nectar, and the resulting honey is of good quality, light amber in color, and spicy (*8, 25*). The bark of the stem, branches, and roots is rich in tannins, and the astringent red sap extracted from the cut bark, commercially known as West Indian or Jamaican kino, was formerly exported to Europe where it was used for tanning and dyeing (*18, 26, 31*). The astringent roots and bark have been used in traditional medicine in Puerto Rico and elsewhere in the Caribbean (*16, 18*).

Sea grape's tolerance of saline soils and sea spray make it an excellent choice for coastal windbreaks and ornamental plantings. It prunes well and makes a good hedge.

GENETICS

The genus *Coccoloba* includes approximately 180 species of tropical and subtropical shrubs and trees occurring in the West Indies, southern Florida, Mexico, Central America, and in South America as far south as Paraguay (*26*). In addition to *C. uvifera,* 12 other species of *Coccoloba,* mostly small to medium-sized trees, occur naturally in Puerto Rico, including 4 endemic species: *C. pyrifolia* Desf., *C. rugosa* Desf., *C. sintenisii* Urban, and *C. swartzii* f. *urbaniana* (Lindl.) Howard (*17, 18, 19*).

Botanical synonyms for *C. uvifera* include *Coccolobis uvifera* Jacq. and *Polygonum uvifera* L. (*25*).

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